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LEAD POISONING IN THE UNITED STATES.

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Only a few years ago, we were most of us under the impression that our country was practically free from occupational poisoning, that American match factories never were troubled by cases of phossy jaw, and that our lead works were so much better built and managed, our lead workers so much better paid, and therefore better fed, than the European, that lead poisoning was not a problem here as it is in all other countries.

The investigation made by John Andrews for the United States Bureau of Labor disillusioned us about our freedom from phosphorus necrosis, and the studies published by the New York State Factory Investigating Commission and by the United States Bureau of Labor Statistics are teaching us that, far from being superior to Europe in the matter of industrial plumbism, we have a higher rate in many of the lead industries than have England and Germany. As a matter of fact, the supposed advantages of the American lead worker, good wages, short hours, a high standard of living, obtain only in a few of the lead trades, such as house painting, plumbing (hardly a lead trade now), printing, and white ware pottery work. Art potteries, tile factories, white and red lead works, storage battery plants, and lead smelters and refineries pay the rate of wages given to unskilled laborers in that particular section and the work day is ten hours, while the standard of living is often very low, the men employed being for the most part foreigners with no permanent relation to the community in which they are working. When to these factors are added the almost universal absence of sanitary control of the work places and of personal care of the working force, it is easy to understand why we have much lead poisoning in industries which in Great Britain and Germany are comparatively safe.

It is not so easy to understand why we have so long been in ignorance

on the subject, why American physicians and sanitarians, to whom all other questions of preventable disease are matters of the greatest interest, should for so long have neglected industrial plumbism, which their colleagues on the other side of the water had so effectively controlled. After all, it is a question for the public health men to solve, and, no matter what protective laws are passed by legislatures, we shall never really reform our lead trades until the sanitarians of the country grapple with the subject.

It will not take long to give a sketch of what we know about lead poisoning in the United States. The first published report was that of the Occupational Diseases Commission of Illinois. In 1911, 578 cases of lead poisoning were found to have occurred in the three preceding years, in Illinois, 308 of them in the last year and most of them in Chicago. About seventy different industrial processes had given rise to these cases.

Dr. John Andrews' analysis of 60 fatal cases of industrial plumbism in New York State was the next publication, appearing in Bull. 95 of the Bureau of Labor. This throws light on many occupations not ordinarily associated in the minds of physicians with the danger of lead poisoning.

Then the state of New York took up the study of this disease and so far, two reports have been published by the Factory Investigating Commission, the first under the management of E. E. Pratt, confined to New York City, and the second taking in all the state and conducted by Graham-Rogers and John H. Vogt. Doctor Pratt made an intensive study of several industries in New York, notably the white and red lead trade, the making of paints and colors, and the use of lead as a tempering agent. He found easily 121 cases of lead posioning in this city in 1911, including only those that were relatively serious. Doctor Graham-Rogers' report covers practically every lead industry in the state, some of which, as the making of storage batteries, pottery work, the making of rubber, are described in full detail. The analyses of air made by Mr. Vogt show a state of contamination truly startling in certain industries. Thus in the mixing of materials in a rubber factory, as much as 8.0 mg. of lead were found in a cubic meter of air. As an adult breathes about 4.5 cm. in the course of ten hours, it follows that a workman here might inhale 36.0 mg. during his day's work. Legge* says that 0.5 mg. in a cubic meter is the limit of safety, and Teleky† says that a daily dose of 10 mg. may lead to severe symptoms in a few weeks. Other places in which these investigators found gross contamination of the air were near lead pots of solder or babbitt, where 5.0 mg. and 3.6 mg. and 2.6. mg. per cubic meter were found. In a storage battery factory they found in the pasting room 4.6 mg. and in the lead-burning room, 2.6 mg.

The lead industries which have been studied intensively by the Federal

*Legge, Ann. Rep. Chief Insp. Fact. and Workshops for 1912.
†Teleky, Protokoll d. Sitzung d. gross. Rats d. Inst. f. Gewerbelhyg, 1912.

Bureau of Labor* are the making of white and red lead, the glazing of pottery and tiles, the enamelling of sanitary ware, the painters' trade, the smelting and refining of lead and the making of storage batteries. The white lead industry in the United States is more dangerous than in England or Germany, because we use dry methods where they use wet, and therefore have a more serious dust problem. Owing partly to the evident risks, this industry has of late undergone great reforms, and in the majority of our plants there is a constant and intelligent effort to protect the men. The same thing is true of all but a few of the red lead factories.

Glazing of pottery and, to a slighter extent, decorating it, is one of our bad lead industries and yet not enough attention has been attracted to it to bring about the needed reforms. Fortunately, both New Jersey and Ohio, the two chief pottery states, are now concerning themselves seriously with industrial plumbism and the dangerous conditions in the potteries will probably soon disappear. This is the only lead trade studied by the Bureau in which women are employed.

Even more fraught with danger is the porcelain enamelling of sanitary ware, bath tubs, sinks, etc. The red hot ware from the furnaces must be thickly dusted over with a ground glass containing soluble lead in proportions of 0.5 per cent. to 20.0 per cent. During the process, the air is cloudy with this dust, and enamelers suffer not only from tuberculosis but from acute and often severe lead poisoning. At the time the investigation was made, 1912, there were practically no provisions for cleanliness in these factories nor for dust prevention.

The painters' trade is regarded in all countries as the most difficult of all the lead trades to control, because it is carried on under such varying conditions. In factories, the same control can be exerted over painters as over the other workmen, but much of the painters' work is done outside factories. In the United States, the branches of the painters' trade in which the danger from lead is greatest are the painting of carriages, especially the wheels, interior house painting, ship painting and the painting of interiors of railway cars. This is because in all these branches much white lead is used and is sandpapered, producing lead dust, the worst feature in the painters' trade. Comparatively safe branches are the painting of agricultural machinery, wagons, automobile bodies, the exterior of freight cars, all of which are now usually painted by dipping or spraying and often with leadless paint.

The United States is a great lead-producing country and the smelting and refining plants visited in the course of the Government investigation employ some 7,500 men. Dust and fumes are the great dangers here, the provision of wash rooms and baths is not nearly as important as it is in such industries as white and red lead where the men are smeared over

*Bulletins 95, 104, 120, 140.

with soluble salts. In lead smelting, it is the fine dust and the volatilized oxides which give rise to poisoning. Our smelting industry does, to a certain extent, try to protect the workers from poisoning but though there are very few really shockingly bad plants, there are none that can be called admirable.

Storage batteries are assemblages of lead grates with a paste of lead oxides rubbed into the interstices. The workers are exposed to lead fumes in casting and in joining the plates together, and to lead oxide dust in making and applying the paste. It is in all countries regarded as one of the worst of the lead trades, and is hedged about with all sorts of restrictions. In the United States it has only very lately attracted any attention at all, and the conditions under which the work is done in our factories are conducive of a very high rate of poisoning.

Many of the establishments in which these manufacturing processes are carried on employ physicians to take care not only of accidental injuries but of sickness, especially lead poisoning. The opportunity which these men have of controlling the sanitary conditions in the plant is sometimes very well used. I have found company physicians acting as sanitary experts, going through the plant with the superintendent and working out with him the problem of dust or fume prevention. Such physicians keep records of their cases and are able to see which department is sending in an undue share and needs clearing up. Unfortunately, this kind of physician is in the minority. Much more common is the man who stays in his office and lets the men come to him, who knows little or nothing of the conditions under which they work and is impressed with the idea that lead poisoning is chiefly caused by the men's own ignorance and carelessness. I have had many such doctors tell me seriously that it is the lead that gets under the finger nails which does the harm, and this while the men they were discussing were working in an atmosphere foggy with lead dust or fumes. I have had others tell me that the men will always suffer from lead poisoning as long as they refuse to wash before eating their lunch, and all the time I knew that the plants which employed these physicians had given the men no place to wash and no time to go home at noon and get clean. But they continue to preach cleanliness without ever troubling to find out if their advice can possibly be obeyed.

There is here a great neglected field in American medicine and one of growing importance, for each year the number of industrial establishments which employ physicians increases, and the opportunity for expert hygienic control of our dangerous trades increases. But there will have to be a more general understanding of the problems of industrial hygiene before the service rendered by the majority of company physicians becomes of much real value.